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TNH4002-Control of Internal Parasites of the Horse

The University of Tennessee Agricultural Extension Service

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EQUIFACTS

Control of Internal Parasites of the Horse

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The health of the equine population is a primary concern for horse owners because it is related to reproduction, growth, performance and the overall well-being of the horse. A rigid herd health protocol for parasite control will never fit every individual situation; however, there are certain guidelines that all good horse owners can follow in establishing a parasite management program. Horse owners must review the problems of their particular farm or locality and make the herd health program fit the individual situation.

More than 150 types of internal parasites are known to infect horses. However, from a practical standpoint, the four most significant ones are **strongyles, ascarids, pinworms and bots**. This fact sheet will discuss the major and minor internal parasites of horses and offer various recommendations for developing an effective parasite control program.

Ascarids (roundworms)

The ascarid (*Parascaris equorum*) is a large roundworm that primarily affects foals and young growing horses. Immunity develops by exposure to these parasites during adolescence, so mature horses are usually not infected by ascarids. The adult parasite may reach a length of 5 to 22 inches. The life cycle of the ascarid starts as the horse swallows eggs with feed, pasture or water. These eggs hatch, and the resulting larvae burrow into the wall of the small intestine where they migrate into the veins. Next they travel to the liver, heart and subsequently to the lungs. These ascarid larvae migrate via the blood supply from lung tissue to air spaces where they are coughed up, reswallowed, return to the small intestine and mature.

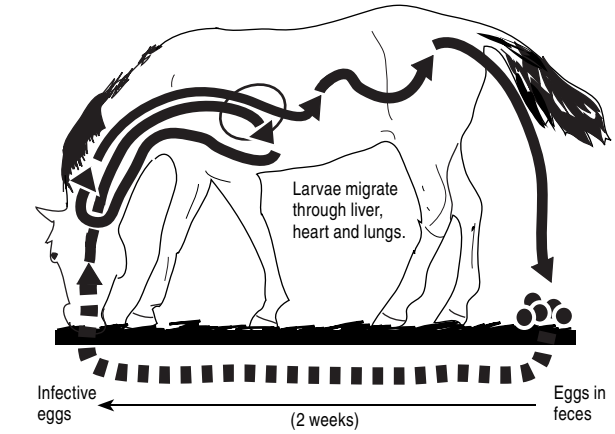

Figure 1. Cycle of infection by large roundworms.

Damage to the foal or young horse begins during this migration. Physical damage, inflammation and scarring of liver and lung tissue, are results of the migration. Damage from adult worms can range from slight digestive irritations and decreased feed absorption to intestinal blockage and subsequent colic.

It takes about three months for the life cycle of the roundworm to be completed. Eggs will start appearing in the manure of foals 10–13 weeks old. The female worm will lay up to 200,000 eggs per day, and these eggs are passed to the outside in the manure. In about two weeks, a larva develops inside the egg, which becomes infective. The eggs are very resistant to adverse conditions and may remain infective for years on pastures and in stalls. Therefore, ascarids are passed from one foal crop to another. Because of the longevity of infective eggs, the object of ascarid control is to prevent any environmental contamination with roundworm eggs. This requires deworming at least every two months through the first year of life.

Signs of ascarid infection include unthriftiness, pot belly, rough hair coat, slow growth and depression. Some foals will develop a cough and nasal discharge that does not respond to antibiotic treatment.

Strongyles (bloodworms)

Strongyles are the most significant and the most common of all the internal parasites of horses. They occur in horses of all ages, except the neonatal foal, and are prevalent throughout the world. The sexually mature strongyles are found within the large intestine and are commonly divided into two groups: the large strongyles and small strongyles.

The majority of strongyle larvae occur on pasture vegetation, and little transmission occurs indoors. Strongyle larvae are extremely resistant to adverse weather conditions because they are enclosed in a sheath. They survive freezing winters easily but are killed by hot, dry summer conditions. Once these larvae are ingested, they lose their sheath and enter the lining of the small intestine, cecum and large intestine.

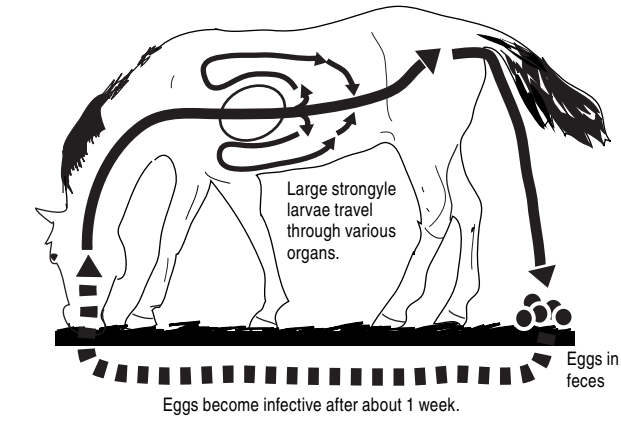

Figure 2. Cycle of infection by large strongyles or bloodworms.

The large strongyle group is made up of three species of general significance. *Strongylus vulgaris* (bloodworm) larvae burrow into small arteries in the gut wall and migrate to the anterior mesenteric artery, which is the main blood supply to the digestive tract. Their migration causes disruption of blood flow by causing the formation of blood clots in the artery. The larvae remain in the anterior mesenteric artery for approximately 120 days while they grow and develop. Subsequently, they start a return migration down the arteries to the large intestine. Upon maturation, the females may lay several thousand eggs each day, which are passed in the manure. The entire life cycle takes six to seven months.

Two other large strongyles, *Strongylus edentatus* and *Strongylus equinus*, have similar life cycles; however, their migratory pathways are not as dangerous as *Strongylus vulgaris*. They migrate within the liver, causing damage, and then return to the large intestine. Their life cycles are longer, taking from eight to 11 months to complete.

The availability of dewormers to effectively control large strongyles has decreased the significance of these parasites. Today, small strongyles may present more problems than large strongyles. The small strongyles do not migrate beyond the lining of the intestine, so tissue damage is somewhat less severe. A common effect of these parasites may be diarrhea, but small strongyles have also been implicated for an increased incidence of colic.

Foals may show signs of strongyle infection at a very young age. This is many months before the first mature adults will be present in the large intestine, suggesting that larval strongyles are the most damaging stage to the horse, and is a strong argument for prevention of parasitism. By delaying treatment until strongyles mature and lay eggs, tissue damage and disease are allowed to occur.

Pinworms

Pinworms are not very harmful to horses, and they have a relatively simple life cycle (Figure 3). Adult pinworms are found primarily in the colon and rectum of horses and

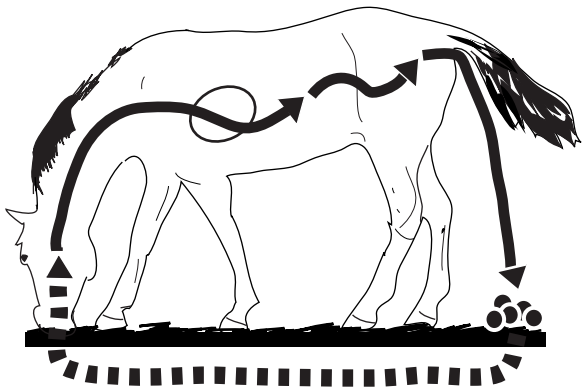

Figure 3. Cycle of infection by pinworms.

lay their eggs around the anus of their host. These eggs drop off and contaminate pastures, water, bedding and feeding areas. After the eggs are ingested by a susceptible host, they develop into maturity in the colon and rectum without a migratory state.

The damage produced by pinworms is minor. They do produce a severe irritation around the tail area which causes the horse to rub its tail. This may produce loss of hair and wounds around the tail due to excessive rubbing.

Stomach Bots

Stomach bots are the larvae of a bot fly. The bot fly, which resembles a honey bee, is the adult stage of this parasite. The females lay eggs on the hairs of horses, especially around the legs. Egg laying may be so annoying that some horses will lose weight because they spend more time fighting this fly than grazing. Friction and moisture are necessary for these eggs to hatch. This is provided by the horse licking the areas where the eggs are attached (Figure 4). Small larvae emerge from the eggs, attach to the tongue and burrow into the tissues of the mouth. However, those on the neck, face and mane hatch and migrate to the mouth and lips on their own without help from the horse. After about three weeks, a second stage larvae emerges, is swallowed and attaches to the lining of the stomach. Although bot larvae probably cause little damage to the stomach, rare cases of rupture of the stomach wall have been reported. Also, the larvae cause erosions on the tongue and gums.

Bots spend approximately nine months attached to the stomach lining before passing out with the manure. These larvae pupate into adult flies. The life cycle depends on the parasite larvae overwintering in the stomach, then passing out in the manure in spring and subsequently developing into adult flies.

The adult flies are active from late spring to the killing frost in late fall. Therefore, treatment for bots should be scheduled from mid- to late-summer and again after a killing frost. This schedule renders winter treatments unnecessary.

Strongyloides (Threadworm)

The intestinal threadworm, *Strongyloides westeri*, mainly infects young foals 4–47 days old. Foals become infected by ingesting larvae in the dam's milk or by penetration of the foal's skin by infective larvae in the bedding. The larvae migrate through the lungs and the small intestine causing injury while passing. The life cycle can be completed in less than two weeks. This creates the potential for severe infection in a relatively short time. Foals quickly develop immunity to these parasites and reject the infection by 60–90 days of age The main problem caused by these parasites is diarrhea, which may not respond to treatment. Some foals with threadworms may become dehydrated and develop other problems related to chronic diarrhea. Strongyloides

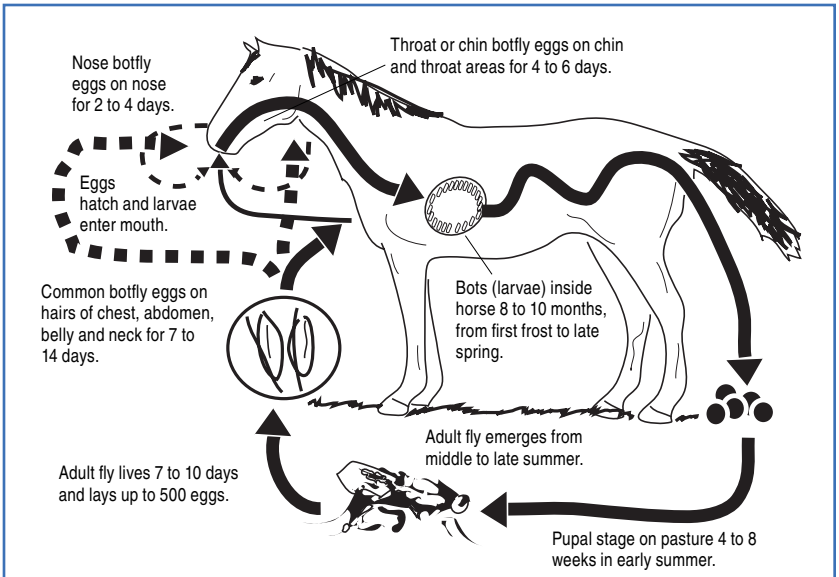

Figure 4. Life cycle of horse botflies.

infections may accompany, but are not the cause for "foal heat" diarrhea.

The major parasites, organs affected, age of horses affected and symptoms are shown in Table 1.

Tapeworm

Tapeworms occur in horses of all ages. Transmission requires an intermediate host, the oribatid mite which exists as a freeliving form on pastures. The horse ingests the mite from pastures, and it takes about two to four months for the tapeworm to mature in the horse. Mature worms first occur in weanlings and yearlings.

Large numbers of tapeworms can cause ulceration in the large intestine and cecum, colic, and a severe form of intestinal blockage. Treatment for tapeworm infections has not been routinely practiced in most areas. However, pyrantel pamoate is effective in removing tapeworms when given at double the normal dosage. Although proper pasture management and manure disposal may help control the mite, complete pasture renovation to eliminate the mite is questionable.

Prevention and Control of Internal Parasites

A universal protocol to eliminate internal parasite infection in the horse does not exist. Each situation is different and is affected by many factors, including climate, season of the year, humidity, rainfall, age of the horse and concentration of horses on the land. Management and medication are the primary methods used to control parasite concentration and influence productivity in the horse.

Management. Any management consideration used to eliminate or reduce a certain phase of the life cycle can assist the horse owner in maintaining or improving efficiency. The key to a successful parasite control program is interrupting the life cycle.

Manure is the primary means of spreading parasites. Manure contaminates the environment, feed and water supply, pastures, paddocks, and stalls. Sanitation plays an important role in parasite reduction. Proper manure disposal will help prevent contamination of the premises. Manure should be composted before spreading it on pastures currently being grazed by horses. Otherwise the manure should be put on cropland or ungrazed pastures. Harrowing or dragging pastures during hot dry conditions may decrease exposure of grazing horses to infective larvae.

Employing good pasture management practices can dramatically reduce internal parasites. The horse owner must prevent overcrowded conditions. As the number of horses increases in a given area, more manure builds up and greater numbers of parasite larvae and eggs exist and become available. This results in the intake of larger numbers of parasites by horses grazing the pasture.

Mowing and harrowing pastures helps break up manure deposits and exposes larvae to the existing climatic conditions. However, mowing and harrowing distribute larvae onto the grass and should never be done on occupied pastures. This practice can be beneficial in a hot, dry summer but could increase infection at other times of the year.

There is little advantage to grazing ruminants (cows and sheep) with horses. However, horses following ruminants or vice versa is beneficial. The parasites that are specific to horses do not affect cows, and the life cycle is destroyed inside the cow. Pasture vacuuming, although expensive, is also very effective.

Separating horses and feeding by class, stage of production or age group will also aid in parasite control. Yearling horses should be managed differently than brood mares because they are affected by different types of parasites. They may also need to be on a different deworming schedule. It is much more difficult to reduce parasite infection if all ages and categories of horses are present in the same paddock.

A simple, yet extremely important management consideration is to never feed horses on the ground. This allows the horses additional opportunity for reinfection with parasites. Always provide hay mangers and feed bunks for all horses. Also these mangers and bunks should be cleaned and disinfected periodically. Water troughs, tanks and buckets should be kept free of fecal material to prevent contamination of the water supply.

Physically removing bot eggs from the hair of horses is also recommended. The bot eggs can be removed with a scraper or a warm, moist sponge or by clipping the hair. Rubbing the eggs with a moist sponge or rag will not remove the egg shells but will cause the eggs

to rupture, releasing the larvae. Removing the eggs from the horse will decrease the possibility of the parasite entering the horse's mouth.

Chemical Control. Many different commercial products are available to remove internal parasites from horses. These drugs are available in several different physical forms and are sold under various trade names. A drug control program to reduce or eliminate internal parasites should be used in combination with a good management control program.

Deworming agents differ in their ability to remove internal parasites. For example, one may control ascarids and bots, another only strongyles, while a third may control strongyles, ascarids, pinworms and bots. It is extremely important for the horse owner to have a knowledge of the deworming compounds and for which parasites they are effective (Table 2). The use of dewormers alone will not be effective in parasite control if management is poor.

Paste is the most common physical form for administering antiparasitic compounds to horses. In addition, dewormers are also administered to horses via a stomach tube and by using feed as a carrier for the compound. These methods used periodically are known as "purge" deworming. That is, all the adult worms that come into contact with the appropriate drugs in the horse's digestive tract are affected.

In addition to the purge control method, there is also a continuous drug control program in which horses consume small daily doses of dewormer. This program gives continuous control for most internal parasites except bots. Regular dosages of avermectin and elevated dosages of other dewormers (fenbendazole, oxfendazole, thiabendazole) are effective against migrating strongyle larvae.

There is no deworming schedule that fits all horses. Climate, humidity, rainfall, season, concentration of horses per land area and age of horses are all factors that influence deworming programs. However, some basic guidelines exist in the industry. Most veterinarians feel that horses should be dewormed at least four times per year. This would include deworming horses for strongyles, ascarids and pinworms four times per year with a dewormer that contains a botacide in the early spring and late fall. Many veterinarians recommend deworming foals and weanlings every 30 to 60 days for the first year of life.

New research indicates that deworming programs work best if treatments are concentrated during the times when climatic conditions are favorable for hatching of eggs, development of larvae and transmission of infection. The annual cycle to control parasites should begin in early autumn (September) and continue through February or March. For optimum control, the horse owner should deworm from September through March "within the egg reappearance period." In other words, deworm with avermectin every eight weeks or every four weeks with other dewormers during this interval.

Researchers indicate there is no need to deworm during the hot summer months because little transmission occurs at this time. They indicate that it is better to concentrate treatments in autumn and winter than to use the same number of treatments spaced evenly throughout the year. Although this program is somewhat different from the traditional deworming schedules, there is increasing documentation for its effectiveness.

It is really important to establish a control program with your own veterinarian. It is also common practice to alternate among chemical families to prevent parasite resistance. Thus, it is necessary to know the chemical relationships of dewormers and the difference between trade names and generic names. Several dewormers are exactly the same chemically active ingredient but are packaged and sold under different trade names.

Some small strongyles have become resistant to certain dewormers; therefore, a fecal egg count can evaluate the efficiency of a dewormer. A veterinarian would conduct a fecal parasite egg count, deworm the horse and repeat the fecal count seven to 14 days later. If the dewormer was effective, the egg count should be reduced by at least 90 percent. However, if the egg count was reduced by less than 80 percent, resistance to the product is probable. Subsequent to the demonstration of resistance, the ineffective dewormer and all compounds chemically related to it should never be used on the farm again. Different families of deworming medications should be administered to these horses.

One of the newest and most effective classes of dewormers is avermectin. It is effective against the four major internal parasites that infect horses and is relatively safe. Since avermectin became available, the incidence of large-strongyle-related colic has decreased dramatically. The use of avermectin every five to six months should eradicate large strongyles on a farm in about two years.

Avermectin also controls skin parasites such as *Habronema* that cause "summer sores."

The largest class of dewormers is the benzimidazoles. They are extremely safe when used alone. An example is fenbendazole, which has a toxicosis factor of 100 times the normal dosage — it would take 100 times the normal dosage to produce illness. This class of dewormers will not control bots and may require higher dosages to control ascarids. Most dewormer resistance reported in horses has been to this class of dewormers.

Phenylguanidines turn into benzimidazoles within the horse's body and provide similar parasite control. They should be rotated as if they were in the benzimidazole class. Pyrimidines are a separate class of dewormers. They are effective against ascarids, strongyles and pinworms. A double dose of the pyrimidines has been effective in controlling the tapeworm.

Table 1: Internal Parasites

Parasite	Organs Affected	Ages Affected	Injury & Symptoms
Strongyles (Bloodworms)	• Larvae - arteries, liver and gut wall • Adults - large intestine	All ages but young especially susceptible	a. Retarded growth b. Loss of weight c. Poor appetite d. Rough hair coats e. General weakness f. Anemia g. Diarrhea h. Recurrent colics i. Death
Ascarids (Roundworms)	• Larvae - liver & lungs • Adults -small intestine	Young (under 2 years of age)	a. Retarded growth b. Pot bellied c. Rough hair coat d. Digestive upsets e. Pneumonia f. Death (ruptured intestine)
Bots	• Eggs - on hair • Larvae -tongue, gums and large intestine •Bots - stomach	All ages	a. Excitement (by flies) b. Digestive upsets
Pinworms	•Adults - large intestine and rectum	All ages	a. Tail rubbing
Strongyloides (Threadworms)	• Larvae - lungs and small intestine • Adults - small intestine	Foals	a. Diarrhea b. Dehydration c. Weight loss

Table 2: Antiparasitic Compounds for Major Internal Parasites of Horses

DRUGS				EFFICIENCY%				
Class/Generic Name	**Trade Name**	**Source**	**Methods[1]**	**Bots**	**Ascarids**	**Strongyles**	**Pinworms**	**Toxicosis Factor**
AVERMECTINS								
Ivermectin	Phoenectrin	Phoenix Scientific	T	95-100	90-100	95-100	95-100	60X
Ivermectin	Eqvalan	Merial	P,T,O	95-100	90-100	95-100	95-100	60X
Ivermectin	Zimecterin	Farnam[2]	P	95-100	90-100	95-100	95-100	60X
	Rotectin 1	Farnam[2]						
BENZIMIDAZOLES								
Fenbendazole (FBZ)	PowerPac	Intervet	T,F,P	0	90-100	95-100	95-100	100X
	Panacur							
	Safeguard							
Oxfendazole (OFZ)	Benzelmin	Fort Dodge	T,F	0	90-100	95-100	95-100	10X
Oxibendazole (OBZ)	Anthelcide-Eq	Pfizer	T,F,P	0	90-100	95-100	95-100	60X
MILBEMYCINS								
Moxidectin	Quest	Fort Dodge	G	90-100	95-100	95-100	95-100	3X
PYRIMIDINES								
Pyrantel-pamoate (PRT)	Strongid-T or P	Pfizer	T,F,P	0	90-100	65-100	60-70	20X
	Rotectin 2	Farnam[2]	P	0	90-100	65-100	60-70	20X
Pyrantel-tartrate	Strongid-C	Pfizer	F	(Prevents infective larvae from entering tissue)				
	Stronaid-C 2X							

[1]P=Paste, T=Stomach Tube, F=Feed, O=Oral Liquid, G=Gel 2
[2]Marketed by Farnam

Organophosphates are the least safe of horse dewormers, They are used primarily to kill bots and typically in combination with other drugs. The drugs, when combined with a botacide, should be used at the exact recommended levels.

A complete listing of dewormers is shown in Table 2.

Summary

Management and chemical control are the two basic methods of internal parasite reduction for maximal production and performance. The total effect of a well-planned internal parasite program that combines management and chemical control is a healthy herd. It is well documented that improved parasite control is a forerunner to reduced colic. Your veterinarians are the local authorities on internal parasites for horses. They can be contacted to help establish a tailor-made program to fit each situation.

Source of illustrations: Evans, J. Warren. *Horses*. Second Edition, 1989.

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